WEST

Generate Collection

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BSPR:
It is an object of the present invention to provide a new integrated routing/mapping information system (IRMIS) capable of enabling the mating and cooperation between desktop and handheld devices, including the automatic updating of related databases whenever the desktop PC and handheld PDA link together. The PDA or handheld personal organizer may be optionally linked to a GPS receiver. It is also an object of the present invention to provide the means to take advantage of the strengths of the desktop or home-base application which provides wider geographical coverage and a fully implemented map/route/point-of-interest (poi) cartographic system, which desktop enables user selectivity or customization of map and route information--optionally tapping into online information. It is another object of the present invention to create data-cutting alternatives such that certain user selections of geographic area, start, finish, POIs, levels of detail or map magnitudes may be effectively downloaded to the PDA/GPS that produce compact map and/or route information "packages" comprising black-white bitmaps, text directions lists, point information organized in differential magnitude configurations which e.g. provide more detail and particular kinds of information around waypoints, less detail and perhaps more major road driving information along the routes between waypoints. It is a further object of the present invention to provide a means to enable a PDA to display text directions and maps (without GPS), serving similar functions to map/itinerary travel plan printouts and to facilitate in a PDA/GPS combination a map display of user's current position, and/or prompting and beeped warnings relative to text directions, as well as heading, distance, speed and other real time GPS data. The present invention is further designed to facilitate in a PDA/GPS configuration location marking and breadcrumb or GPS log functions which can be displayed on the PDA and/or uploaded, displayed, and otherwise processed back at the home-base desktop. Yet a further object of the present invention is the development of a PDA/GPS application can include programming whereby the GPS output controls map/point/route information content and levels of detail--as illustrated by "automatic zoom" upon arrival at area mapped at lesser/greater level of detail or, when a GPS receiving system "senses" that the vehicle has slowed down or stopped, map and point information displays automatically refocus or "look about" to see about restaurants, lodgings or other area attractions.

DRPR:
FIGS. 7A, 7B, and 7C are assembled to form the flow chart referred to in the specification as FIG. 7 showing the user controls and commands made available to the multimedia user of IRMIS.

DRPR:
FIGS. 8A-8E further illustrate the flexible user controls and commands for multimedia related operations of IRMIS.

DEPR:
Alternative embodiments could include other input devices e.g. voice recognition system, joystick, touch-screen, scanner for printed map input, simplified keypad, etc., not represented here. FIG. 1A discloses IRMIS 100 implemented on a single, stand-alone, desktop style, personal computer. The software technology, which facilitates interactivity between routing and multimedia, also works on a more portable laptop or notebook computer, a handheld personal digital assistant (PDA), embedded in a travel planning appliance or an in-vehicle navigation system, as well as on mainframes of various kinds, distributed work stations, or

networked systems. Alternatively, users can also operate IRMIS 100 from a remote interface through wireless or hard-wire links connecting with a distant computer system or a central service bureau as shown at 109.

DEPR:
FIG. 1A shows a map book or set of printed maps typically on paper media 128 corresponding to the electronic or digital map 122 displayed on the screen or monitor 117. The printed maps 128 can be consulted as an aid in using the corresponding electronic or digital maps 122 displayed on screen, and the hardcopy travel plan printouts 126 derived from interactivity between the routing and multimedia elements of the invention. It is expected that users will printout such hardcopy travel plans 126 to guide and direct their journeys on foot, in vehicles, or by other means of travel. Alternatively, the IRMIS invention provides portable PDA/GPS capability to guide users and record information at remote locations as described hereafter.

DEPR:
For example, in FIG. 1A, mouse manipulatable buttons along the bottom of the multimedia window 120 enable the user 103 to command IRMIS 100 to include the lakeside location 124, based on the multimedia presentation 120, as new input for routing. IRMIS 100 facilitates entry or deletion of locations, reviewed in multimedia subject matter, as new starting places, destinations, intermediate waypoints, or points of interest along the way as part of the user-selected route. FIG. 1A represents how user interactions with multimedia about locations can be used to change the route.

DEPR:
Output from the invention can result from a single, simple interaction between routing and multimedia elements. FIG. 1A illustrates a scenario whereby the user-selected only one point of interest, a place by a lake 124, close to a route 123 highlighted upon an electronic or digital map display 122. Next the user prompted the presentation of multimedia information in a window 120 concerning the lakeside point of interest. Prompted by the multimedia presentation, the user then pushed the "Attach" button in the command bar across the window bottom, or otherwise prompted IRMIS to include the lakeside location as an annotated point of interest within a specified distance from the highlighted route displayed upon the map screen or printed on a hardcopy travel plan.

DEPR:
Generally, such PDAs, handhelds or "palmtops" are provided with user alphanumeric input means such as a miniature keyboard, the Palm Computing Platform "graffiti" language for handwritten stylus or pen-point input, and so forth. Hardware and software buttons provide for menus, paging, and other user selection and manipulation means. These portable devices are also typically equipped with gray-scale "touch-screens" for text/graphic display. Such "touch-screens" can be actuated at particular points and/or series of points by touching, tapping, or sliding on the screen with a stylus, or the equivalent of a pen or pencil point.

DEPR:
The IRMIS invention--for example as embodied in Delorme's SOLUS.TM. software--provides a mapping or geographic information system application and data, for use on such PDAs, handhelds or palmtops and equivalent devices, as described hereafter. IRMIS or SOLUS map displays, as shown in FIG. 1A1, can be controlled, queried and manipulated by use of a stylus at 05, managing the virtual equivalent of typical computer mouse commands and manipulations. Alphanumeric text input, handwritten with stylus, is enabled at 06. For example, DeLorme's SOLUS is programmed so that, in a certain mode, the user can "mark" particular locations, recording exact geographic coordinates (e.g. lat/long), and make related notes or text annotations using the stylus or equivalent. By means well-known in the art of programming such portable devices, IRMIS in the form of the DeLorme SOLUS software also facilitates stylus on touch screen operations as follows: (1) the user "picking" points for additional information (e.g., a place name, lat/long, or other text or graphic information associated with the point); and (2) estimating distances by "sliding" the stylus between locations or points on the map display, or along a path or route or user-drawn pattern on the touch-screen map display--prompting an estimated distance readout in feet, kilometers or miles according the scale of the current map display.

DEPR:

FIG. 1A3 shows a generic feasible IRMIS portable platform with built-in GPS, wireless and hard-wire communication options, tangible supplemental applications and/or data in the form of one or more PCMCIA cards, and a CPU link for connecting to home-base desktop or other computers. Preferred IRMIS portable platforms, shown previously in FIG. 1A1, have a detachable GPS accessory, which is not needed when the PDA or handheld is "docked" in its "cradle" or connected to the home-base desktop for data transfer and/or synchronization. Such IRMIS PDAs can be used in the field without GPS, or used in conjunction with GPS receivers built into a vehicle or other appliance. The alternative IRMIS PDA, shown in FIG. 1A3 has the advantage (plus extra cost) of an integral GPS receiver--for example, avoiding the awkwardness in certain situations of two devices, the PDA and accessory GPS, connected with a cable.

DEPR:
Safety Warning: Bring a passenger along to serve as GPS operator while you are driving a vehicle. Solus Pro should not be used in automatic navigation or guidance systems of for any purpose requiring precision measurement of distance or direction. See GPS Position Accuracy for additional information.

DEPR:
When connected to a GPS receiver, your current position appears as a white arrow on the map as you travel and your GPS status appears on the right of the command bar. When your position is within either of the rectangles, Solus Pro automatically zooms in for greater detail. When your position reaches the edge of a rectangle, Solus Pro zooms out.

DEPR:
FIG. 1C also reveals the basic user interface, including a higher magnitude or closer scale map, as shown at 135. Compared to FIG. 1B, FIG. 1C offers a main electronic map display with more detail including geometric symbols in small rectangles under "Seattle" for example. These symbols represent the availability of supplemental travel information on specific types of locations e.g. Hotels, Campgrounds, Restaurants and Points of Interest. One such symbol indicating a realtime or recorded location as sensed by a GPS receiver interfacing with IRMIS is shown at 136a. As disclosed hereafter, the user can access and manipulate the added multimedia travel information by various mouse or keyed commands.

DEPR:
FIGS. 1J and 1K further depict routing functionality plus introduce multimedia capabilities. Accessed for example through the 139 quick menu in FIG. 1G, the Points of Interest Along the Way dialog box at 148 in FIG. 1J exhibits a list of three items termed POIs for points of interest in this disclosure. By prompting the Along the Way command, after inputting an ordered list of waypoint input, the user has caused the software to seek and find POIs within a specified distance from the computed route for which further information is available in the form of audio, pictures or text. By depressing either the Show/Tell All or the Show/Tell One buttons on the right in the 148 Along the Way dialog box, the user can prompt a multimedia presentation or series of presentations as shown at 151 in FIG. 1K. Controls along the bottom of the 151 picture display window on Burlington facilitate user control and selection of multimedia content and form, as described hereafter. In FIG. 1J, the Attach button on the right in the 148 dialog box enables the user to pick, fix and include selections of information with travel plan output, as disclosed further hereafter. Travel Plan dialog or list boxes are shown at 149 in FIG. 1J and 152 in FIG. 1K. Travel Plan list boxes are a form of routing computation output including a list of waypoints, routes, compass directions, nearby town, time and distance estimates for route segments and the overall route.

DEPR:
FIGS. 1-O and 1P illustrate advanced capabilities to do routing or multimedia and combined operations. In the absence of any prior routing input, the user can click on a location, like Seattle at 160, for which multimedia is available. The user can then select various operations or types of information from the quick menu at 161. Selection of Points of Interest, for example, brings up a list box for tourist attractions situated in Seattle as shown towards the bottom of the Points of Interest window for Seattle at 162. As shown in the middle of the window at 162, the user can scroll through text information concerning selected attractions, such as the Museum of Flight. The user can prompt pictorial and audio information using the Show/Tell button at 164. The Show/Tell command

results in a selectable audio or pictorial presentation at 165 and 168 subject to a flexible set of user controls at 166.

DEPR:
As shown in FIG. 1P, flexible control over multimedia form and content enables the user of an in-vehicle embodiment of the invention, for example, to maintain an output of audio 169 travel directions for the driver to hear. Meanwhile, the passenger can monitor the visual route map at 170 and, at the same time, browse through information about places to eat in Seattle using the restaurant list box 171. For in-vehicle use, alternatively or in addition, a GPS receiver linked to IRMIS can provide a display of the vehicle's current position as shown as a dot at 173.

DEPR:
Within the multimedia subsystem 209, step 273 facilitates diverse multimedia information presentations or output on places, locations or geographic objects listed as POI or multimedia input in step 243. The step 273 output or multimedia presentations are subject to flexible user control, inviting further user response and interaction. The invention 200 facilitates user participation in, and user control of, both the form and content of ongoing multimedia presentations. The multimedia subsystem 209 provides access to commands or user options for making further manual selections of individual POIs, or further database POI searches, even in the middle of an ongoing multimedia presentation. In step 273, as detailed hereafter, the user can elect to repeat or skip parts of a multimedia presentation, pick among or combine forms of media such as audio, text or graphics, alter the current POI list governing the order and geographical focus of the unfolding ongoing multimedia experience, or prompt alternative or more detailed multimedia presentations about the places of interest to the user.

DEPR:
Thus, the system 200 enables the user to generate, review, reshape, edit, improve, simplify, complicate or otherwise amend a custom, personalized or individualized travel plan. Travel plans are typically the product of a unique process of interactivity, consisting of particular series of routing and multimedia operations, arranged by the user. The user can impose his or her idiosyncratic responses or personal choices to shape each operation's form and content, or repeat and vary operations, by adjusting parameters and by exercising commands and options disclosed in more detail hereafter.

DEPR:
The invention 200 also provides for selectivity, flexibility and iteration in composing operational sequences so that the user can engage in extended integrated series of operations to develop and refine a single personalized travel plan. Such unique custom or individualized travel plans typically culminate from sequences of pure or combined multimedia or routing operations. The system 200 is interactive, i.e., enabling the user to control operational content, sequencing, parameters and media. This disclosure uses the term "interactivity" to describe how the system 200 provides for flexible ongoing user control over the order or sequencing of operations, and the exercise of optional commands and parameters, shown generally at 211, 215 and 219. User options are described further relative to FIGS. 1B-1M and 1-O to 1P which picture the user interface for one embodiment. Command and parameter options that influence multimedia or routing format, content or sequencing are also disclosed in relation to FIGS. 3, 4, 7, 8A-8E. For one example, the user can calibrate or adjust the module for routing calculations, at 245 in FIG. 2, to get the quickest or shortest travel route, or other preferred or optimal parameters for routing computations, as detailed relative to FIG. 4. For another example, paths 233, 235, 261, 263, 267, 241, 251 and 269 comprise optional pathways for the transfer of location data and travel information in various media between the routing 205 and the multimedia subsystems. Selecting among these pathways, the user controls sequencing, combination and iteration of multimedia and/or routing, as detailed hereafter. Also, alternative options to start and stop operations shown at 203, 204, 275, 277 and 279 facilitate user control over operational arrangements as well as input and output formats. Moreover, the user exercises flexible controls over the medium, topical focus and substantive content of the geographic information or travel presentations which are generated in the multimedia subsystem 209 in FIG. 2, described hereafter in more detail relative to FIGS. 8A-8E.

DEPR:
For example, going back to the case of planning travel from Boston Mass. to New York City N.Y., the user commenced operations at 203 in the routing 205 rather than the multimedia subsystem 209. On the one hand, the user can conduct sequences of pure routing, adding intermediate waypoints and varying routing parameters, as formulated for example by the short hand expression R1, R2, R3=R01. Other even longer pure routing operational sequences could involve added evaluation of alternate means of transport. On the other hand, the invention 200 provides the user with commands or options for variously interposing multimedia operations.

DEPR:
FIG. 2 also provides an overview of the user options and program controls, described in greater detail elsewhere in this disclosure as, for example, command menus, dialog boxes, control panels, adjustable parameters and global/local system settings. The user exercises such user options by command input and system management methodologies well known to software artisans e.g. conventional keystroke sequences; mouse, joystick or touch-screen manipulations on pertinent pixel locations, symbols and buttons; command text entries; voice-recognition technologies; macros and batch commands; and equivalents. In various embodiments, particularly embedded applications, such user control mechanisms are consolidated, overlapping, redundant, or simplified, as dictated by consumer requirements, user friendly design criteria and anticipated usage patterns.

DEPR:
For conceptual purposes, FIG. 2 depicts three distinct control interfaces, one for routing 211, another for the interaction block 215 and a third for multimedia 219. Simple dotted lines, at 213 and 217, indicate that all command and control interfaces are accessible between blocks or subsystems, one from another. Users involved in a routing process, for example, can stop in mid-operation and access the interaction or multimedia commands and controls. Some implementations have routing, interactivity and multimedia buttons or controls visible on screen from within any given mode of operation, particularly simplified versions of the invention and embedded applications.

DEPR:
At 286, in response to the user command to load the PDA, the inventive IRMIS software cuts or extracts the map, route, and/or point information selected by the user, and "packages" it for use in the PDA. This process of cutting or extracting a geographical information subset collects data from one or more map screens--including information on POIs and routes picked by the user, as further detailed hereafter particularly relative to FIG. 5F.

DEPR:
FIG. 3 is a flow chart illustrating the organization and procedural logic of the commands or user options available to multimedia users of the preferred embodiment of IRMIS. The system combines multimedia and routing to provide a software utility for personal and business travel planning. FIG. 3 depicts data transfer pathways as well as the hierarchy of commands and user options available to users in the Points of Interest system listbox or dialog box shown in FIG. 1J. In the multimedia mode, the user can call up this dialog box on top of the map display that typically dominates the computer screen.

DEPR:
FIG. 3 relates to the user options 219 and POI input 243 steps found within the multimedia subsystem block 207 in FIG. 2. In FIG. 3, dotted lines and reference numbers delineate the margins of the routing 205 and interaction 207 subsystems portrayed in FIG. 2. FIG. 3 shows the particular multimedia user options and commands for POI input and pertinent data transfers embodied in IRMIS in relation to the more generalized FIG. 2 system block diagram.

DEPR:
In FIG. 3, processing begins at reference letter C. The user can activate the multimedia mode at 301 in the first instance for purposes of composing fresh or new multimedia presentations uncombined with prior operations. Activation of the multimedia mode facilitates user access to the user options and commands shown in FIGS. 1J, K, L, M, O and P as well as FIG. 3. From C, the user proceeds to step 319 to select or get fresh POI inputs for multimedia presentations implemented by looping back through C to steps 305 and 307. This is how, in the vocabulary of

this disclosure, pure multimedia is started by the user from scratch, uncombined with prior routing or multimedia. But, the user can also recycle pure multimedia through C typically for replay with variations in media, focus, contents or locations.

DEPR:
Either to start a fresh pure multimedia presentation or to modify one or more pre-existing POI lists, the user proceeds from C to step 319 in order to get and decide on POI inputs in several ways. Users can get and manually enter one or more POIs typing in place names, geographic coordinates or other literal location indicators. The user can also seek, pick or delete POI input by browsing lists of locations, or other situated data, and choosing points of interest. Moreover, the user can employ cartographic or graphic means in order to locate potential POIs to be added to or deleted from the current POI input list. This typically is done by positioning the cursor on locations, symbols, geographic coordinates, place names, etc. on the current map display. The user can manipulate the cursor position on the map display with the mouse, arrow keys or other means in order to recenter the map display, causing it to shift or pan laterally to a new location centered on a different latitude and longitude. In summary, the "GET POI" operations at 319 include user options to add, delete and rearrange the POI input list along with shifting or recentering the map display on the current POI. Users can also opt for zooming down to a closer map scale for a more detailed perspective or zooming up or out to get a more global outlook covering larger territory. IRMIS utilizes such flexible and intuitive capabilities to zoom among map scales or shift across digital maps, seeking POI input, with map generation and cartographic database technology as disclosed in the David M. DeLorme U.S. Pat. Nos. 4,972,319 and 5,030,117. The user can also shift, or recenter, map displays to locate POI inputs by entry of telephone numbers, zip codes, street address information and other located or locatable data. IRMIS provides several textual or graphic methods for the user to get POI input by means of selective commands and procedures made available at step 319. The system also enables the generation and modification of lists of POI inputs by various methods for database searching and sorting well known in the art of computer programming.

DEPR:
In a typical usage of the system, the multimedia mode of operation of the invention is invoked at C, deploying the command and user option arrangements illustrated in FIG. 3. POI inputs are transferred and transformed within the interaction block 207 into the multimedia subsystem 209 in the form of a list of POIs found in proximity to a route previously computed, as revealed at 303 and detailed hereafter in relation to FIGS. 5, 6A & 6B. Step 303 deals with output from a previous operation of routing, transferred from the routing subsystem and transformed into multimedia input for processing, subject to the user options and command organization shown in FIG. 3. In this fashion, the user is enabled to selectively experience multimedia information about locations and points of interest along the way or within a user-defined region around, i.e., circumscribing an optimal route already computed. Steps 309, 315 and 325 enable the user to return to and modify the previous route or travel plan output with changes typically based on the user's responses to an intervening IRMIS system multimedia presentation.

DEPR:
FIG. 3 illustrates the commands and user options made available to users upon startup or recycling of the multimedia mode of operation of IRMIS. Through 301 and C, the user can make a completely fresh start on a pure multimedia process, proceeding to get and locate POI input by a great variety of means at step 319. Step 319 is also available for users to get or revise multimedia input for amendment of one or more pre-existing POI lists. Recycling of a preexisting list of POI input through C can involve pure multimedia inputs, generated without reference to routing. As presented for multimedia processing at 303, data transformed into multimedia input from previous routing output illustrates POI input in the form of an amendable or modifiable preexisting list that is not pure multimedia. Rather, it derives from and is combined with previous routing operations.

DEPR:
The user can opt for a selectable multimedia presentation on any single POI input of his or her choice at step 305, described further in relation to FIG. 7 hereafter. Such Show/Tell One operations unfold from E, as shown in both in FIG.

3 and FIG. 7. After or in the midst of such multimedia presentations about a single POI or location, the user can return to C, typically in order to add or cull one or more POIs as just experienced in multimedia to or from his or her travel plan. The user can also prompt further presentations of located multimedia information which vary in form, media or level of detail as detailed hereafter. Similarly, at 307, FIG. 3 depicts user options and commands for multimedia presentations on a total list of POIs. Step 307 Show/Tell All functions proceed from reference letter F, as disclosed hereafter with respect to FIG. 8A. The user is also able to return from the midst or conclusion of a Show/Tell All operation to C in order to browse the multimedia command set and user options in FIG. 3.

DEPR:
The dialog box or organized set of commands and user options in FIG. 3 also facilitates initial transfer or return of ongoing operations to the routing mode as well as termination of the multimedia mode of operations in favor of some new or fresh operation or sequence of operations, or in order to exit the program entirely. The user options in FIG. 3 correspond to the 162 dialog box in FIG. 1-O and the 161 quick menu. Steps 309, 315 and 325 allow access to, and modification of, subsequent routing operations performed within the routing subsystem or block 205 revealed from a more general perspective in FIG. 2. Step 327 provides an exit from the multimedia mode. Step 327 corresponds to step 279 and partly to step 277 in FIG. 2. After exiting at 327 in FIG. 3, users can commence fresh operations, on the one hand, by starting anew in the routing mode, as detailed elsewhere in relation to FIGS. 2 and 4. On the other hand, exiting at 327, the user can begin a completely new or unprecedented multimedia operation, or sequence of operations, reactivating the multimedia mode at 301, and then proceeding through C in FIG. 3.

DEPR:
FIGS. 4A,4B, and 4C are assembled to form the flow chart referred to hereafter as FIG. 4. FIG. 4 is a flow chart illustrating the processes and user options included in the routing mode of a preferred embodiment of IRMIS. The system is a component software travel planning tool which combines multimedia and routing. FIG. 4 relates to the operational sequences, data transfers and user controls implemented by way of the Manage Route dialog box depicted at 138 in FIG. 1G. The user can access this suite of tools, commands and processes, invoking the routing mode of operations, by calling up the Manage Route dialog box on top of a portion of the map display which pervades the computer screen in typical applications of the system.

DEPR:
In FIG. 4, steps 406, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427 and 429 comprise the waypoint entry module in which the user can engage a suite of commands in to add, clear, delete or insert waypoints or routing input. The specific process for waypoint input shown here in FIG. 4 corresponds to the more generalized step 231 in the FIG. 2 Block Diagram. The user is also able to access waypoint input commands while in the multimedia mode, in order to provide for immediate transfer of POIs to become input for new or recycled routing operations. As portrayed in the FIG. 2 block diagram at 211, 213, 217 and 219, a user can access commands and options betwixt and between the routing 205, interaction 207 and multimedia subsystems. For clarity in this disclosure, however, waypoint input operations are presented as prompted and executed within the routing subsystem.

DEPR:
In FIG. 4, steps 406 and 409 mean that the user can opt to exit from or close the waypoint input module. Like virtually all operations embodying the invention, waypoint input is achieved on top of a computer map display, which becomes part of the waypoint input interface, as described hereafter. In the lexicon of this disclosure, waypoints are route input items including one point of departure, one final destination and, optionally, one or more intermediate loci entered in order of travel. Waypoints are highlighted as input with inverted green triangle symbols on the map display as shown at 147 in FIG. 1G. As entered, waypoints also appear on a list in the order to be encountered on the intended journey, as shown in the Manage Route dialog box illustrated at 138 in FIG. 1G. The list of waypoints arranged in planned order of travel in the Manage Route dialog box corresponds to step 411 in FIG. 4. The user works in the waypoint entry module or command suite until he or she elects to close the function at 406 and 409, or to compute a route at 433, or to transfer waypoint input through 431 in order to

experience selected multimedia information about the waypoint locations and nearby places.

DEPR:
In alternate embodiments of IRMIS and enhanced commercial versions, routing or waypoint input can encompass airports plus flight paths, bus stations and bus routes, railroad terminals and tracks, subways and other urban transit systems, offroad vehicle travel, trails for bicycles, hiking and other pedestrian paths as well as oceanic, coastal and inland shipping channels, also boat launches, portages and river passages for canoes or rafts, plus other commercial and recreational transport and travel means. Even more generalized point-to-point routing more or less "as the crow flies" over rasterized or digitized computer maps can be added. The present system is applicable to a broad range of point and vector data structures familiar in the routine arts of geographic databasing and digital cartography including but not limited to the foregoing specific input/output formats for waypoints or POIs as detailed in relation to FIGS. 5, 6A and 6B.

DEPR:
The Manage Route dialog box in the July 1994 MAP`N`GO (TM) 1.0 travel planner embodiment also provides access to a Preferred Routing dialog box, shown in FIG. 1H, enabling the user to favor or avoid the following road types: limited access roads; toll roads; national highways, primary state or provincial roads; lesser state and provincial roads; major connectors; forest roads; and ferries. The Global Speed Setting dialog box in FIG. 1I enables users to adjust the estimated or expected speed of travel on each the foregoing road types in response to user preferences or expectations with regard to a leisurely pace or need for haste, weather, traffic, construction or vehicle problems which the user might anticipate.

DEPR:
For another example of combined operation output at step 453, path 403 facilitates the user transferring POI data from the multimedia subsystem 209 through the interaction subsystem 207 to become new waypoint input, either expanding or shortening the current list of waypoint inputs. Any resulting routing computation and its ensuing output at step 453, which are based on this new list of waypoints, therefore incorporate the user's responses to and interaction with the preceding multimedia transferred to the routing subsystem 205 via path 403. Relative to route output/display at 453 in FIG. 4C, IRMIS embodiments preferably provide users with some control options or command means (dialog boxes, menus, keystroke sequences, . . . etc.) in order to select various outputs or output combinations. Thus users can select levels of detail, various map printouts and displays, text directions, lists of attachments, supplemental information on POIs, audio and/or graphics. At 463, users can additionally or alternatively command IRMIS electronic digital output: e.g. (1) transferring map, route, and/or point information into an IRMIS PDA interfacing the IRMIS desktop--for portable use in the field; or (2) transmission of IRMIS output to other computers. IRMIS invention further facilitates transfer of point information, like multimedia on POIs, to portable IRMIS devices from the IRMIS desktop or home-base. Such map, routing and/or point information can be used on one or more IRMIS PDA devices (with or without GPS).

DEPR:
Steps 455, 457, 459, 461, and 463 enable the user to choose among formats for the routing display/output at 453 in FIG. 4. These steps correspond with the more general options for mixed or pure routing output available to the user in steps 215 and 211 in FIG. 2. As shown in FIG. 4, the user options selected through step 455 are controlled through dialog boxes, menus, text commands and other routine user interface technologies. Step 457 enables the user to prompt route output in the form of a voice or text list of waypoints presented in planned order of travel with or without verbal or literal travel directions and other located information associated with items on the waypoint list. Step 457 also allows the user to opt for such audio or text output either in conjunction with or in lieu of the map display or visual route output.

DEPR:
For example, while driving, the user of an in-vehicle embodiment can turn off the map display as an unnecessary visual distraction, using step 457 to retain spoken output about waypoints, route directions as well as other located audio

information pertaining to places along the way. Step 457 also permits simultaneous audio-visual output, for example, so that the driver can listen to audio output about his or her travel plans while a passenger is also looking at the highlighted route and other information on the map display as illustrated in FIG. 1P. Step 457 further permits turning off the audio output so the driver and passenger can listen to music or converse while the passenger keeps an eye on the visual map/route display. Further details on audio/visual options for multimedia output, which can be combined with routing output at 453, are disclosed in relation to FIGS. 7, 8A-8E. Software control of IRMIS output/display format and/or contents on portable IRMIS devices, based on GPS/route variables, is further described in relation particularly to IRMIS FIG. 9.

DEPR:
But, POIs are not confined to tourist attractions and travel accommodations. Alternative embodiments of the present invention handle a great variety of public facilities or infrastructures as geographic point type POI data e.g. POLICE as shown on the 501 map display. Located or locatable objects in geographical space can also qualify as POIs e.g. THING at 505 on the map display shown at 501. THING might comprise a fixed landmark of human or natural origin. THING might also comprise a moveable object such as a vehicle, another item of personal property, a migratory animal or species, a person on foot, or other non-stationary phenomena as currently known, estimated, or predicted to be at a particular location. POIs can also include intended locations such as the proposed location of a building, a place to meet, or the site of a planned event. The term POI or point of interest lower case encompasses extensive types of geographical point data identified with or related to located or locatable objects which can be input, described, depicted and accounted for in a multimedia database.

DEPR:
In FIG. 5B, note that the line buffer methodology did capture POIs at P-H in grid C-II, and at P-C in grid A-III, where the 526 circle technique missed these same POIs. The 551 method of the line buffer is therefore preferable in cases of POIs found between circles adjacent to and accessible to computed routes. The line buffer data structure is also preferable for ground vehicles capable of off-road travel as well as travel by air, boat or on foot, i.e., transport which can handle detours and side trips off-route between nodes. On the other hand, the method of circles shown at 526 is better for trips by rail or other transport which stops only as scheduled at predetermined waypoints, without possibility of detouring or side trips off the beaten track.

DEPR:
FIG. 7 assembled from FIGS. 7A-7C and FIGS. 8A-8E illustrate the flexibly organized suites of user controls and commands as procedurally structured and made available on the multimedia side of IRMIS. Consistent with the object of facilitating user friendly capabilities for combining routing computations and multimedia about locations, the multimedia mode of the present invention offers the user many selections and ways to interact with the overall technology. In relation to FIGS. 7, 8B, 8C and 8D the specification details how users are enabled to selectively play available information about locations and situated objects picking among available audio modes e.g. voice, music, natural, or created sounds, graphic and pictorial images or alphanumerical text. The user can shape his or her multimedia experience by isolating these various media and topics of interest. Users are also able to mix and integrate multimedia contents and formats.

DEPR:
In FIG. 7, steps 718 and 720 illustrate user options and controls which enhance flexibility and selectivity of play in the multimedia mode. Dotted line boxes and connecting lines, as in 718 and 720 and between 708 and 718, represent user commands, options, and controls made available throughout a series of steps. Thus, for example, step 718 options are available all during any sound 710 or picture 708 show and any text 712 display as well as any combinations thereof. As shown at 748, 749 and 750, the slide control options at step 718 are essentially buttons of the familiar rewind, stop and fast forward types which let the user replay, halt or advance any presentation in any medium. More detail is provided on these slide control options relative to FIG. 8D.

DEPR:
FIG. 7 presumes the underlying map display encompasses or is centered upon the

single pertinent POI. But, shown generally at step 307 in FIG. 3 and detailed in FIGS. 8B and 8C the Show/Tell All command prompts multimedia presentations about each item on an entire list of POIs. Depending on map scale and the distance between POIs, not all POIs on a given list necessarily appear on the map display serving as background and cartographic interface on the computer screen for practically all embodiments and uses of the present invention. FIG. 8A illustrates the process that automatically shifts or pans the map display, as required, to center upon the geographic coordinates of the POI currently the focal point of a Show/Tell All multimedia presentation.

DEPR:
Step 811 determines whether the current POI is the last item on the current POI list subject to a Show/Tell All command. If the process revealed in FIG. 8A has reached the last item on the current POI list, then the forward slide option or button is dimmed or turned off in step 812. Step 812 is a housekeeping matter. It makes no sense for the user to try and call for the next item on the POI list when the last item on the POI list has already been reached.

DEPR:
From F2, the operations illustrated in FIGS. 8B and 8C proceed to steps 813 and 814 which are implemented concurrently. Although alternate embodiments of the invention might default to a text display of information about the current POI, the Show/Tell All command of the system prefers available sound or audio output and pictures or visual/graphic images. Available sounds, such as travelog narrations, are played at 818 from beginning to end subject to user control of audio volume, tone, etc. in step 825. In alternate embodiments, audio output calls for user interaction or responses. The audio output pauses and waits for an appropriate user response, proceeding apace if the user does not answer for a predetermined interval. IRMIS displays available pictures for a preset, adjustable time in step 816.

DEPR:
The MAP`N`GO (TM) July 1994 release automatically displays literal non-vocalized text as words printed typically in a window over the map display on screen only in the event that no sound or pictures are available relating to the current POI location. The interplay between steps 813, 814 and 821 demonstrate this logic. However, step 823 enables the user to opt for display of silent alphanumeric text information on screen, supplementing available pictures. This feature addresses the practical reality that, while audio-visual output is preferred for many consumer travel information embodiments, many users and installed systems lack sound cards and speakers. Moreover, though audio output is preferred as a rule for drivers alone who must keep their eyes on the road and instrument panel, under some circumstances, in vehicle users opt for having a passenger monitor literal text and pictures in windows on the map display, electing to turn the sound off to facilitate conversation or for enjoyment of silence or listening to music tapes or news on the car radio for example.

DEPR:
PDA OUTPUT CONTROL 904 is also impacted at least by user commands and pre-set preferences 909 as well as memory 911 and available data. For example, one IRMIS embodiment, SOLUS.TM. Pro implemented on 3COM.TM. Palm.TM. Computing platforms, automatically "zooms" shifting to greater detail, closer view maps or higher magnitude maps when such mapping information is to be found in the PDA memory for the PDA user's current geographic position indicated by the GPS. Thus, the OUTPUT CONTROL 904 software is programmed to query both the PDA memory for available maps at a closer scale and the GPS for current position information. The user can override this default shift in map scales by inputting his/her preferences at 909.

DEPR:
As described in CAMLS, LOOK ABOUT is a map screen mode which focuses on more detailed information about points of interest, or attractions and facilities, around the user's current geographic position as detected by the GPS. LOOK ABOUT provides restaurant menus, describes motels, parks, museums, and other accommodations found within a radius of distance or travel time around a point. The FIG. 9 OUTPUT CONTROL implements LOOK ABOUT, for example, as a function of the GPS detecting that the user has slowed down below a preset speed and/or has stopped completely for a pre-set span of time. In other words, when driving instructions are not critical, and when the user is more likely to be interested

in his/her surroundings, LOOK ABOUT de-emphasizes "Directions" and "Navigate" screens, and displays more detailed map screens and/or information about points of interest surrounding the PDA user's current location. Alternatively, while the user's vehicle is en route, even when approaching a next turn, the passenger who does not have to watch the road can manually prompt LOOK ABOUT at 909 in FIG. 9 to get added information about local attractions and facilities.

DEPL:
Safety Warning: Bring a passenger along to serve as GPS operator while you are driving a vehicle. Solus Pro should not be used in automatic navigation or guidance systems or for any purpose requiring precision measurement of distance or direction. See GPS Position Accuracy for additional information.

DEPL:
Safety Warning: Bring a passenger along to serve as GPS operator while you are driving a vehicle. Solus Pro should not be used in automatic navigation or guidance systems or for any purpose requiring precision measurement of distance or direction. See GPS Position Accuracy for additional information.

DEPL:
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DEPL:
Safety Warning: Bring a passenger along to serve as GPS operator while you are driving a vehicle. Solus Pro should not be used in automatic navigation or guidance systems or for any purpose requiring precision measurement of distance or direction. See GPS Position Accuracy for additional information.

DEPL:
Safety Warning: Bring a passenger along to serve as GPS operator while you are driving a vehicle. Solus Pro should not be used in automatic navigation or guidance systems or for any purpose requiring precision measurement of distance or direction. See GPS Position Accuracy for additional information.

DEPV:
2. Tap the Route Directions tool on the command bar. The Route Directions dialog box appears on the screen.

DEPV:
4. The latitude and longitude of the map's center are displayed on the command bar, along with the magnitude of the map.

DEPV:
2. Tap the Satellites tool on the command bar.

DETL:
To track: 1. Connect your H/PC to DeLorme's GPS receiver with DeLorme's Windows CE adapter cable (available separately from DeLorme). 2. After you have sent your route to the H/PC, tap the Solus Pro icon on the desktop to open the program. 3. Tap the Connect tool on the command bar or choose GPS . . . Connect . . . to begin communication between Solus Pro and your GPS receiver. A message appears at the top of the screen indicating the status of your GPS connection. "Connecting" indicates that Solus Pro is attempting to communicate with the GPS receiver. "Acquiring Satellites" indicates that the GPS receiver is acquiring satellite

information, but is not yet receiving sufficient satellite data to determine your position. This message is displayed while the receiver is acquiring satellite data and can take several minutes. "2-D Nav" indicates that you are receiving data, but it is not sufficient to determine your elevation. "3-D Nav" indicates that you are receiving ample data and have a good fix. 4. After achieving 3-D Nav status, you have three tracking options: if you want to track using your Directions, tap the Route Directions tool to view the Directions that you calculated in Topo USA. As you travel, Solus Pro highlights the next road you will use and beeps 60 seconds before your next route change. If you want to track using a map, tap the Map tool to view the map that you created in Topo USA. Your position is indicated on the map by crosshair as you travel. You can also track in the Navigate mode. Tap the Navigate tool to view your current route status. The instructions for your next route change appear at the bottom of the screen and update as you travel. The time and distance to your Finish appear above. 5. Choose GPS . . . Disconnect to stop displaying your route on the screen. NOTE: In order to conserve batteries, be sure to disconnect the adapter cable when not using DeLorme's GPS receiver with your H/PC .rect-hollow.

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Help | Logout | Interrupt

Main Menu | Search Form | Posting Counts | Show S Numbers | Edit S Numbers | Preferences

Search Results -

Terms	Documents
l5 and l6	37

Database:
US Patents Full-Text Database
US Pre-Grant Publication Full-Text Database
JPO Abstracts Database
EPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Refine Search: l5 and l6 Clear

Search History

Today's Date: 12/17/2001

DB Name	Query	Hit Count	Set Name
USPT	l5 and l6	37	L7
USPT	command	162371	L6
USPT	l3 and l4	45	L5
USPT	vehicle	345645	L4
USPT	l1 and l2	227	L3
USPT	handwrit$	4509	L2
USPT	voice adj recognition	3833	L1

WEST

Generate Collection

L7: Entry 6 of 37 File: USPT Mar 27, 2001

DOCUMENT-IDENTIFIER: US 6208713 B1
TITLE: Method and apparatus for locating a desired record in a plurality of records in an input recognizing telephone directory

BSPR:
This invention relates to devices for maintaining a telephone directory of names and telephone numbers which a user frequently calls. More particularly, the invention relates to locating a desired record from among a plurality of records in an input recognizing telephone directory. Input which may be recognized by such a directory includes voice input and handwritten input.

DRPR:
FIG. 6 is a flowchart of a voice recognition algorithm according to a first embodiment of the invention;

DEPR:
The apparatus includes a microprocessor 16, random access memory 18, read only memory 20, and input and output devices shown generally at 22 and 24 respectively. The input devices 22 include a keypad 26, a voice recognition unit 28 (including a microphone and speech digitizer, not shown) and a CLID receiver 30. The output devices include a dual tone multi-frequency (DTMF) generator 32, an audio prompter 34 and a liquid crystal display (LCD) unit 36.

DEPR:
The voice recognition unit 28 cooperates with the microprocessor to produce a number which uniquely identifies an utterance made by the user, and a voice tag, or digitized sound clip of the user's voice. The number acts as a characteristic representation of at least one identifying characteristic of a rendering associated with the record. In this embodiment the rendering is a voice utterance made by the user. The characteristic representation is used for comparison with further utterances to "recognize" what the user is saying. The voice tag is used by the audio prompter to "playback" the name of a party.

DEPR:
The voice recognition unit 28 also recognizes standard commands such as "YES" or "NO" and responds to such commands by providing to the microprocessor command data packets indicative of the command received. Thus all matching of user-spoken utterances to commands takes place at the voice recognition unit 28.

DEPR:
The audio prompter 34 includes a speaker 44 and is operable to playback the name of a party as digitized by the voice recognition unit.

DEPR:
A third memory address area 70 acts as a personal directory and includes a plurality of memory registers in a third address range. This area is used to store a third set of telephone call event records associated with parties the user is most likely to call. Each record of this third set includes name, number, characteristic, frequency and voice tag fields 72, 74, 76, 78 and 79. The name and number fields 72 and 74 identify the party and are used to store telephone numbers and names of parties with whom telephone calls have been conducted and the frequency field 78 stores a frequency metric related to the number of times a telephone call is conducted between the user and the party identified by the associated name and number fields. In this embodiment, the frequency metric is the number of times a telephone call is conducted with the party. The characteristic field 76 is used to store the characteristic representation

produced by the voice recognition unit 28.

DEPR:
The voice tag field is operable to store the digitally recorded representation of a user-spoken name of the party, as produced by the voice recognition unit. The contents of the voice tag field are operable to be provided to the audio prompter 34 to cause the audio prompter 34 to provide an audible signal which the user can recognize and associate with the party identified by the name and number fields 72 and 74.

DEPR:
Referring to FIGS. 1, 4a and 4b the Add algorithm is shown generally at 150 and serves to add to the personal directory 70 new records obtained from the dial directory 56, the incoming directory 58 or which may be entered by the user via the keypad 26. The Add algorithm 150 is invoked upon receipt of an add key interrupt from the add key 42 on the keypad 26 or a call from the dial, incoming or voice recognition algorithms.

DEPR:
The user may respond to such prompts either by keypad entry, or by simply speaking the words "YES" or "NO" into the voice recognition unit 28. The microprocessor, display and audio prompter thus act as a prompter.

DEPR:
If the user does not want to store such information, the user replies with the utterance "NO" and then block 154 directs the microprocessor 16 to prompt the user to indicate whether a record is to be copied from the dial directory 50 or the incoming directory 58 or whether a new record is to be added and wait for a command utterance from the user. If the user wishes to copy from the dial directory 50, block 156 directs the microprocessor 16 to store the address of the first record of the dial directory 50, in the pointer register 84. Similarly, if the user wishes to copy from the incoming directory 58, block 158 directs the microprocessor 16 to store the address of the first record in the incoming directory 58 in the pointer register 84.

DEPR:
Block 172 then directs the microprocessor 16 to prompt the user to enter a non-standard utterance which is received as an audible sound at the voice recognition unit 28. The voice recognition unit 28 may request some verification, after which the user's utterance is digitized and input representation packet is produced and forwarded to the input port 38 by the voice recognition unit 28. This voice packet is stored in the characteristic field 76 of the corresponding record 71 in the personal directory 70 and acts as a characteristic representation of at least one identifying characteristic of a rendering associated with the record. In this embodiment, the rendering is an oral utterance. The Add algorithm 150 is then ended.

DEPR:
Referring to FIGS. 1 and 5, the function algorithm is shown generally at 180 and serves to enable the user to effect calling and programming instructions by keypad entry or simply by uttering voice commands recognizable to the voice recognition unit 28. The function algorithm is invoked upon receipt at the microprocessor 16, of a keypad interrupt in response to activation of a predefined key or key sequence.

DEPR:
The user responds to the prompt by keypad entry or by uttering either of these words back to the voice recognition unit 28, which recognizes these utterances as commands and responds by providing to the input port 38 a packet indicating the word spoken or entered by the user. If the user has spoken the word "PROGRAM", block 184 directs the microprocessor 16 to prompt the user for further input by providing a packet to the audio prompter 34 to cause it to sound clips of reconstructed speech to sound the words "ADD" or "DELETE". If the user responds with the word "ADD", the microprocessor 16 is directed to location "A" of the Add algorithm 150 of FIGS. 4a and 4b and processing continues as described above in connection with the Add algorithm 150.

DEPR:
If the user responds with the word "DELETE", block 185 directs the microprocessor

to wait for the user to say or enter the name associated with the record to be deleted. Upon the user entering the name, via the keypad, a pointer to the identified record is produced and stored in the pointer register 84. If the user utters the name to the voice recognition unit, the name is recognized as a non-standard command and a representation of the user's utterance or input representation is provided to the input port of the microprocessor and the first voice recognition algorithm is invoked.

DEPR:
Referring to FIG. 6, the first voice recognition algorithm includes block 222 which directs the microprocessor 16 to compare the input representation with the contents of the characteristic fields of the records in the personal directory and assigns confidence metrics to the records respectively, each of the confidence metrics representing a respective probability that a respective record is the desired record. Block 222 also directs the microprocessor to determine the address locations of first and second personal directory records having characteristic field 76 contents statistically nearest to the voice packet in the input representation buffer 88, or providing the first and second best matches to the voice packet. Thus, block 222 determines which of the records have the first and second highest confidence metrics.

DEPR:
In the above manner, where the first and second records with the highest confidence metrics are similarly statistically near the desired record, the selection of the desired record is made on the basis of the frequency of use of the first and second records. Thus the user's own habits are used in the determination of the desired record. The use of the user's own habits to select the desired record thus enhance the determination of the desired record, especially with the use of the voice recognition unit 28.

DEPR:
Block 190 then directs the microprocessor 16 to prompt the user to indicate whether the next successive record is to be addressed or whether the currently addressed record is the one of interest. The microprocessor 16 transfers a packet to the audio prompter 34 causing it to annunciate the word "NEXT?" and waits for a reply or input to be received at the voice recognition unit 28. If the user responds with the word "DELETE", block 192 directs the microprocessor 16 to delete the currently addressed record 71 and the algorithm 180 is ended. If the user responds with the word "NEXT", the next successive record is addressed, (i.e. the next most frequently used record) and execution of the algorithm resumes at block 188 which retrieves, displays and causes to be annunciated this next successive record. By the user repeatedly responding with "NEXT" at block 190, the records in the personal directory 70 are successively addressed starting with the least frequently used record. Thus, the user is immediately directed to records which are most likely to be the most desirable to replace and user need not scroll through the personal directory records in the order in which they were entered. This, of course, saves time. In addition, this permits hands free operation of the apparatus which can be useful in areas such as a vehicle, where the user's hands and eyes are occupied with other matters.

DEPR:
Block 198 then directs the microprocessor 16 to prompt the user to indicate whether the next successive record is to be addressed or whether the currently addressed record is the one of interest. The microprocessor 16 transfers a packet to the audio prompter 34 causing it to annunciate the word "NEXT?" and waits for a command response to be received at the voice recognition unit 28. If the user responds with the word "CALL", block 200 directs the microprocessor 16 to load into the pointer register the address of the record currently displayed. The list branch of the algorithm 180 is thus completed and the microprocessor 16 is directed to continue processing at location "A" of the dial algorithm 90 shown in FIG. 2.

DEPR:
If, at block 202, the user simply speaks the name of the person he wishes to call, the voice recognition algorithm is called and responds by depositing into the pointer register 84, the address of the most probable matching record. Processing then resumes at location A of the dial algorithm.

DEPR:

Generally, the function algorithm acts to call, list or program records in the personal directory 70, in response to voice commands issued by the user of the telephone 12. In response to a call command, the algorithm 180 directs the microprocessor 16 to automatically dial the telephone number of a person identified by the user through a voice command. In response to a list command, the algorithm 180 directs the microprocessor 16 to cause to be visually displayed and annunciated the names of persons having call event records in the personal directory 70 and automatically dial the number stored in the number field 74 of a selected record 71. In response to a program command, the user can add or delete records 71 stored in the personal directory 70 by merely speaking appropriate commands.

DEPR:
Referring to FIG. 7, a personal directory record according to a second embodiment of the invention is shown generally at 240. The record has name, number, characteristic, and frequency of use fields 72, 74, 76 and 78 as in the first embodiment but further includes a frequency of success field 242 for storing a number representing the frequency of success of matching the input representation of a name uttered by the user with the contents of the characteristic field of the record. Initially, the frequency of success field 242 is set to zero, but is updated in accordance with a second voice recognition algorithm which is a combination of the voice recognition algorithm shown in FIG. 6 and a determination algorithm shown in FIG. 8, according to the second embodiment of the invention.

DEPR:
Referring to FIG. 6, the second voice recognition algorithm includes blocks 222, 225 and 226 of the first voice recognition algorithm, but replaces the remainder of the first voice recognition algorithm with the blocks of the determination algorithm shown in FIG. 8. Thus, after block 226 of the first voice recognition algorithm in FIG. 6, block 244 of FIG. 8 directs the microprocessor 16 to determine whether or not the higher confidence metric, determined at block 222 in FIG. 6, is greater than a fourth pre-defined value and at the same time whether or not the difference in confidence metrics is greater than a fifth pre-defined value. If so, then the record with the highest confidence metric is considered to be the desired record. Block 246 directs the microprocessor 16 to increment the frequency of success field (242 in FIG. 7) of the record with the higher confidence metric and block 248 directs the microprocessor 16 to load into the pointer register (84 in FIG. 1) the address of the record with the higher confidence metric. The algorithm is then ended.

DEPR:
It will be appreciated that continued use of the voice recognition algorithm according to the second embodiment of the invention could result in the contents of the frequency of success fields arriving at an overflow condition. To prevent this, the frequency of success fields having values greater than zero are decremented at periodic intervals, such as once per month, or once per week, depending upon the intensity of usage of the apparatus.

DEPR:
While the determination algorithm shown in FIG. 8 has been described in connection with the frequency of success field, it would be possible to replace the frequency of success field with a frequency of use field as discussed in connection with FIG. 6, and the decisions made at blocks 256 and 262 and resulting paths could be made on the basis of the contents of frequency of use field. Generally, the use of the determination algorithm of FIG. 8 with the frequency of use field is desirable where the user places a large number of outgoing calls and the use of the determination algorithm with the frequency of success field is desirable where the user uses the voice recognition aspects of the invention extensively. It is also possible to use the determination algorithm of FIG. 8 with both the frequency of use field and the frequency of success field, both of which may be used additively as a compound frequency value or weighting factors may be used with each frequency value.

DEPC:
Voice Recognition Unit

WEST

Generate Collection

L7: Entry 32 of 37 File: USPT May 19, 1998

DOCUMENT-IDENTIFIER: US 5754430 A
TITLE: Car navigation system

BSPR:
This invention relates to a car navigation system for obtaining information on a route which is suitable to guide or navigate a car (vehicle) to a destination by beforehand registering the destination and inputting at least one place name indicated on a road sign.

BSPR:
In a car navigation system according to the claim 2, place names indicated on a map which is reproduced and displayed on a screen by an image display device and data on pronunciations of the place names (written in Kanji) are provided to a road map data base. Therefore, place names such as via-places, etc. can be specified by inputting the place names with voice using a voice recognition device (in the following description, a via-place is defined as a place through which the car passes to the destination). Furthermore, when a hand-writing input device is used, the place names such as via-places can be also specified by inputting the place names in Hiragana or Katakana with a pen or the like. Accordingly, a hand-write character recognizing unit of this system can be more facilitated in construction than a hand-write input device which needs recognition of Kanji. In addition, it is difficult to accurately input complicated Kanji characters during running because of car vibration. On the other hand, the Hiragana or Katakana character input of the place names makes the hand-writing input operation more easily.

BSPR:
For example, in the car navigation system having the place name input means using a voice recognition device and the judgment result output means using a voice synthesizer, when the driver or the like voices one or plural place names which are written on a road sign, the place name input means analyzes the voice and supply the input one or plural place names to the route judgment means.

DRPR:
FIG. 3 is a block diagram showing a voice recognition device;

DEPR:
The destination input means 4 and the place name input means 5 (see FIG. 1) are designed to input a destination and a place name serving as a target for the course judgment with a voice using a voice recognition device 40. The voice recognition device 40 can recognize the voice of any speaker, and its recognition rate can be improved by beforehand registering the voice of a specific speaker (for example, a driver).

DEPR:
Therefore, the voice recognition device 40 includes a level adjustment circuit 42 having an AGC function for adjusting the output signal 41a of a microphone 41 to a predetermined signal level, a noise removing circuit 43 for removing noise components and emphasizing a specific frequency band component and removing undesired frequency components so that a voice signal is suitable for voice analysis, a voice analyzing circuit 44 for analyzing the features of a voice signal 43a for analysis from which the noise components are removed and which has frequency components suitable for the voice analysis to code the voice signal 43a, a collate circuit 46 for comparing and collating the analysis data (voice input) 44a output from the voice analysis circuit 44 and the analysis data (comparison reference) 45a supplied from an analysis data storing circuit 45 to

output analysis result data 46a representing coincidence or similarity degree for these analysis data, a recognition result output means 47 for outputting a destination input command 47a and place-name input data 4b on the basis of the analysis result data 46a, monosyllable data and vocabulary data 45b, a register control means 48 for registering the voice of a specific speaker, a key input interface (I/F) circuit 49 and an operation unit 50 having various operation keys.

DEPR:
The operation unit 50 includes a destination key 51 for registering a command voice (command words) when the destination is input with voice, a road guide key 52 for registering an command voice (command words) for starting a road guide operation, cursor shift keys 53a to 53d for scrolling a map displayed on the screen of the image display device 9 and registering an command voice (command words) to shift a position indicating cursor displayed on the map, an enter (set) key 54 for registering an command voice (command words) to determine and input the position of the shifted cursor, and a voice register key 55 which has plural keys and serves to register the voiceless sounds of the Japanese syllabary, the voiced sounds, the syllabic nasal in Japanese, numerals, words such as alphabetic letters, etc. in accordance with the pushing frequency of each key and the combination of pushed keys (multi-pushing).

DEPR:
On the other hand, the specific speaker such as a driver or the like can register his favorite words in accordance with the operation of the keys 51 to 55. Any words such as "the end of travel" and "which course" may be used and registered for the destination setting and the start of the course guide, respectively. The words of "ue", "shita", "hidari", "migi", "up", "down", "left", "right", etc. may be used and registered as command words (key words) for the shift of the cursor and the scroll of the map, and further the word of "OK" may be used and registered as a command word (key word) to determine the cursor position and the map.

DEPR:
The destination setting means 4 and the place-name input means 5 are designed so that the input operation can be performed by using the various keys 51 to 55 of the operation unit 50 and by jointly using the operation of the keys 51 to 55 and the voice. For example, the following actions may be performed. That is, the destination key 51 is pushed to shift the mode to the destination register mode, and then a destination name is input with voice. Thereafter, the road guide key 52 is pushed to shift the mode to the course guide mode, and then the via-place name is input with voice. Accordingly, the recognition result output means 47 monitors the key input information 49a output from the key input interface circuit 49 at all times, and it is designed to generate and output not only the commands corresponding to the voice input, but also the commands corresponding to the key input and data 47a to 47c. Reference numeral 47c represents a cursor shift command for scrolling the cursor position and the map or determining them, and reference numeral 47d represents a voice unrecognizableness output signal representing that the voice recognition cannot be performed.

DEPR:
The operation unit 50 is provided with map type selection keys 56a to 56c for selecting the map type such as a broad area map, a middle area map, a detailed area map or the like. When the map type selection keys 56a to 56c are operated, the corresponding map selection command 47e is output from the recognition result output means 47. The selection of the map type may be performed by voicing a key word such as "broad area map", "middle area map", "detailed area map" or the like.

DEPR:
The voice analysis circuit 44 is provided with a continuous word judgment circuit for judging a series of voice period (phrase) on the basis of an envelope waveform of an analysis voice signal and time variation of a power spectrum, and supplies the judgment result 44b to the collate circuit 46, the recognition result output means 47, the register control means 48, etc. to identify the punctuation of the voice input command. Accordingly, even when plural place names of "Tokorozawa", "Kawagoe" and "Omiya" are input for the course guide, these voices are identified as three kinds of place names, and the place-name input data 47b of the three place names are supplied to the navigation control unit 7.

DEPR:
A pen input operation which is conducted on a handwrite input tablet 56a of pressure-sensitive type or electromagnetic induction type is detected by a pen input detector 56b, and the hand-write character recognition means 56d makes an analysis of writer's handwriting, an analysis of the order of making strokes in writing a character, etc. on the basis of the detection output 56c of the pen input detector 56b. The character code data 56e corresponding to the identified characters are supplied to the recognition result output control means 57a in the recognition result check/output control unit 57.

DEPR:
The recognition result output control means 57a temporarily stores into a temporary storage means such as a RAM or the like (not shown) the character code data 56e which are successively supplied from the hand-write character recognition means 56d while considering the supply order (the handwriting order).

DEPR:
An operation input unit 58 comprising a transparent touch panel switch or the like is provided on the display screen of the operation unit display 57c, whereby the operation input areas 58a to 58e corresponding to functional displays such as destination setting, course guide (via-place input), input mode switching, cancel (one-character delete for hand-written characters), OK (input character check), etc. are operated with a pen tip or a finger to perform the input of various kinds of functions. The input operation of the operation input unit 58 is detected by the operation input detector 57e, and when the input operation of the destination setting is carried out, the destination input command 47a is supplied to the navigation controller 7.

DEPR:
When supplied with the input mode indication signal 57h representing the cursor shift mode, the hand-write character recognition means 56d outputs a cursor shift command 47c corresponding to the pen input direction (the shift direction of the pen) and the shift distance (or shift speed and shift distance) thereof. Through this operation, the scroll of the map and the shift of the cursor displayed on the map can be performed with the same operation performance as a pointing device (image position indicating device) such as a mouse or the like.

DEPR:
When the detection output of the cancel operation is output from the operation input detector 57d, the recognition result output control means 57a cancels the character code data which are supplied just before the supply of the detection output. Accordingly, the characters which are displayed on the input character check display area 57d are deleted from the rear side one by one every time the cancel operation is carried out. Through this operation, correction can be performed for an erroneous handwriting input or an erroneous recognition of a character. On the other hand, when supplied with the detection output of the OK (input character check) operation, the recognition result output control means 57a successively outputs the character code data corresponding to the character array, etc. which are temporarily stored in the temporary storage means as the place-name input data 47b. Through this operation, the place name of the destination or the place name which is a target for the course guide is supplied to the navigation controller 7.

DEPR:
The hand-write input operation unit 59 having the handwrite input tablet 56a is provided with a pen receiver 59b on which a pen 59a is mounted and fixed for an emergent use, and also provided with a palm rest portion 59c for mounting hands or wrists thereon below and at the side of handwrite input tablet 56a (a hatched area). Therefore, the handwriting input operation can be more stably performed even when running vibration occurs.

DEPR:
The handwrite character recognition unit 56d is designed to recognize only characters of Hiragana or Katakana, numerals and some symbols so that the data amount required for the analysis of the writer's handwriting and the order of making strokes in writing a character is reduced to reduce the storage area of these data, and a time required for recognition is shortened.

DEPR:
The handwriting input tablet 56a may be formed of transparent or excellently light-permeable material and disposed on the display screen of the operation unit display 57c.

DEPR:
The data base access means 71 has a function of indicating the map type such as the broad area map, the middle area map, the detailed area map or the like on the basis of the map selection command 47e, and a function of generating and outputting an access request signal 2a for accessing the corresponding data on the basis of the car position data 3a successively output from the car position detection means 3, the position data 73a output from the pronunciation-position management means 73, and a search request 73b.

DEPR:
The pronunciation-position management means 73 corresponds to a so-called dictionary for place names in which the position data 73a are output on the basis of the place-name input data 47b. On the basis of the presence or absence of the destination input command 47a, it judges whether the place-name input data 47b supplied from the voice recognition device 40 or the handwrite character recognition device 56 corresponds to the place name of the destination or the place name of a via-place or the like, and outputs the position data 73a containing information on the destination/via-place, etc.

DEPR:
When the route judgment means 76 receives a signal 47d representing that a place name or the like input by voice or handwrite cannot be recognized, from the destination setting means 4 and the place name input means 5 constructed by the voice recognition device 40 or the handwrite character recognition device 56, or receives a signal 73e representing that there is no place name concerned, from the pronunciation-position management means 73, the route judgement means 76 supplies the judgment result output means 8 with a judgment result 8a representing that the input is requested to be carried out again, or that the judgment cannot be performed. In this case, through the voice output means 80 in the judgment result output means 8, a voice guide message such as "please input once more", "the name of .DELTA..DELTA. is not registered" or the like is output, and through the image output means 90 in the judgment result output means 8, message image data 90a such as "please input again", "the place name is unrecognizable" or the like is generated to display the guide image message on the screen of the image display device 9 through an image synthesizer 78 and a display device interface unit 79.

DEPR:
The guide information generating means 77 controls the shift of the position of the cursor displayed on the screen of the display device 9 on the basis of the cursor shift command 47c, and supplies the destination position register data 77b to the route judgment means 76 when the destination is registered by the determination input of the cursor position while it supplies the current position register data 77c to the car position detector 3 when the current position is registered.

DEPR:
A case where the destination and all the input via-places are displayed at the same time is shown in FIG. 11(a). MM represents a mark indicating the position of the destination M, MK1 to MK3 (MKn) represent marks indicating the positions of the respective input via-places K1 to K3 (kn), MJ represents a mark indicating the vehicle position, LM represents a line connecting the vehicle position and the destination, and LK1 to LK3 (LKn) represent lines connecting the respective via-places, etc. to the vehicle position, respectively.

DEPR:
Thereafter, the guide information generating means 103 displays the line LM extending from the vehicle position to the destination, the line extending from the vehicle position to the via-place or the like which is judged to be suitable (in this embodiment, line LK2), and the lines extending from the vehicle position to the other via-places (in this embodiment, lines LK1, LK3) with different line types (thickness of line, the kind of line such as a solid line, a chain line, etc.) or different display colors so that these lines are discriminable from one

another.

DEPR:
Therefore, when the driver or the passenger inputs one or plural place names written on a road sign or the like into the car navigation system 1, a suitable route is indicated with a voice message, and a road map containing the destination and the input place name(s) is reproduced and displayed on the screen 9a of the image display device 9. In this case, the positions of the destination and the input via-place names, the vehicle position and the lines connecting the vehicle position to these positions are displayed on a map in such a way as to be easily visible, so that the route can be checked using the map display in combination.

DEPR:
When any map which contains the positions of all place names serving as targets for the route judgment cannot be selected, the route judgment means 101 supplies the guide information generating means 103 with place-name data on the positions of the place names which cannot be displayed on a selected map, and data 101b on the direction extending from the vehicle position to each of the positions of these place names and the distance in a straight line extending from the vehicle position to each of the positions.

DEPR:
Upon reception of these data 101b, the guide information generating means 103 displays an arrow extending from the vehicle position to the destination and an arrow extending from the vehicle position to a via-place or the like, and generates image data for guide information JM on the destination which indicates the place name of the destination and the distance to the destination at the arrow side, and for guide information FJK on the place names of the via-places and the distance of the straight line.

DEPR:
In a car navigation system according to an alternate embodiment, place names indicated on a map which is reproduced and displayed on a screen by an image display device and data on pronunciations of the place names (written in Kanji) are provided to a road map data base. Therefore, place names such as via-places, etc. can be specified by inputting the place names with voice using a voice recognition device. Furthermore, when a hand-writing input device is used, the place names such as via-places can be also specified by inputting the place names in Hiragana or Katakana with a pen or the like. Accordingly, a hand-writing character recognizing unit of this system can be more facilitated in construction than a hand-writing input device which needs recognition of Kanji. In addition, it is difficult to accurately input complicated Kanji characters during running because of car vibration. On the other hand, the Hiragana or Katakana input of the place names makes the hand-writing input operation more easily.

DEPR:
Furthermore, the destination input means and the place-name input means are constructed by using the voice recognition device or the handwrite character recognition device, the destination and the via-places can be easily input.

CLPR:
4. The car navigation system as claimed in claim 1, wherein said destination input means and said place-name input means are constructed by a voice recognition device.

CLPR:
5. The car navigation system as claimed in claim 1, wherein said destination input means and said place-name input means are constructed by a handwritten character input device and a handwritten character recognition device.

CLPR:
13. A navigation method for a vehicle navigation system, comprising the steps of:

CLPV:
directing the vehicle along the calculated travel route;

CLPV:

while the vehicle is on route to said desired destination, inputting a place name other than said desired destination into the system;